



January 20, 2022

SITE ENGINEERING NARRATIVE

To Accompany Municipal Permitting Applications for
Definitive Site Plan Approval
and Notice of Intent

For

MEDIA ARTS, COMPUTING, AND DESIGN BUILDING

151 Woodland Street
(a/k/a 9 Hawthorne Street)
Worcester, MA

Prepared for:

TRUSTEES OF CLARK UNIVERSITY

950 Main Street
Worcester, MA 01610

Prepared by:

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Project #14804



Nitsch Project #14804

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ATTACHMENTS

- **Water Quality Inlet Sizing Data**
- **DEP Stormwater Checklist**
- **Long-Term Pollution Prevention Plan And Stormwater Operation And Maintenance Plan**

1.0 PROJECT SUMMARY

Trustees of Clark University ("Clark") is proposing to construct and develop a new 4-story, approximately 70,280 gross square foot media arts, computing, and design academic building (the "New Building"), along with a quad area, accessory parking, new curbing and walkways, landscaping and other related facilities and improvements (the "Project"). The New Building will contain a lecture hall, classrooms, video and virtual production labs and studios, computer labs, video game library, offices, lounges, collaboration areas and other areas. The Project will be located on Clark's main campus, on the southwesterly side of Hawthorne Street and surrounded by the Colin Flug Graduate Study Wing, the Cohen-Lasry House, the Woodland Administration Building and accessory parking on the same or adjoining parcels (which are all owned by Clark). The Project will be located entirely within the Institutional, Educational (IN-S) zoning district and no overlay districts.

2.0 EXISTING CONDITIONS

2.1 Existing Site Development

The Project will be constructed at 151 Woodland Street, Worcester Assessor's Parcel ID #06-042-08-11 (the "Site"). The Site is currently developed with the Woodland Administration Building and accessory parking lots and access drives. The parking lots include a total of 78 parking spaces with landscape islands and bituminous asphalt curbs.

The Site is accessed by three driveway curb cuts including:

- On Woodland Street approximately 160 feet south of Hawthorne Street;
- On Woodland Street approximately 250 feet west of Main Street; and
- On Hawthorne Street approximately 140 feet east of Woodland Street

The Site is completely developed with the building, pavements, and landscaped open space. No natural / undisturbed vegetated areas are present on or adjacent to the Site.

2.2 Site Utilities (municipal systems)

Sanitary Sewer

The sewer service for the Woodland Administration Building is derived from a 15" sanitary sewer main located in Woodland Street. A 12" combined sanitary/storm sewer is present in Hawthorne Street that serves the buildings that abut the Site.

Water Services

The water services to the Woodland Administration Building are derived from a 12" water main in Woodland Street (low service, 1894, cleaned and lined 1988). An 8" water main is present in Hawthorne Street (low service, cement-lined ductile iron, 2012).

There are no existing fire hydrants on the Site. The building on the Site and adjacent buildings are served by several hydrants located in the Woodland Street and Hawthorne Street right-of-ways.

Storm Drainage

Stormwater runoff generated by the existing parking lots and access drives is managed by a series of catch basins that collect and convey stormwater runoff to the combined sewer in Hawthorne Street. There do not appear to be any stormwater management systems related to flow attenuation, groundwater recharge, or water quality treatment present on the Site. A separated surface drainage system is present in Woodland Street, but no connections from the Site to that system are apparent.

2.3 Other Characteristics

Several environmental and regulatory factors have been evaluated in terms of effects on the redevelopment potential for the Site. None of the following factors has been determined to be applicable to the Site or Project:

- Wetland resource areas & flood plain
- Wildlife habitat
- MEPA permit thresholds
- Historically significant resources

The Project is within 100 feet of an inlet to the surface drainage system in Woodland Street and disturbance within that area and/or connections to the Woodland Street system will establish permitting jurisdiction under the Worcester Conservation Commission via the City of Worcester Wetland Protection Ordinance.

3.0 PROPOSED CONDITIONS

3.1 Proposed Redevelopment Overview

The Project involves demolition of portions of the existing surface parking areas and construction of a new 4-story, approximately 70,280 gross square foot media arts, computing, and design academic building (the “New Building”), along with a quad area, accessory parking, new curbing and walkways, landscaping and other related facilities and improvements.

3.2 Construction Period

Access and Site Management

The Site will be secured and completely enclosed by a construction security fence. Access for construction vehicles and personnel will occur in the vicinity of the existing vehicle curb cuts at Woodland Street. The existing curb cut at Hawthorne Street will be closed. Temporary construction facilities and equipment including office trailer(s), dumpster(s), portable sanitary facilities, and large excavation/construction equipment, will be located within the limits of the construction site enclosure. Parking of personal vehicles by construction personnel will occur on the construction site to the extent practical, and some on-street parking in designated parking areas may be required. Due to the relatively compact nature of the Site with regard to the proposed building footprint area, it is anticipated that material stockpiling on the Site will include limited storage of construction materials and supplies and that large volume soil stockpiling will not occur. All products of demolition including but not limited to grubbed stumps and landscape waste, construction debris, and rubbish will be removed from the Site and legally disposed of.

Erosion and Sediment Control

The Site is relatively flat with little to no areas that will represent substantial erosive concern during construction. As a precaution, the Site will be enclosed with a perimeter erosion and sediment control barrier to prevent incidental conveyance of sediment from disturbed areas. All existing drain inlets on or in close proximity to the Site, and all new drain inlets, will be fitted with filter basket inserts or other protective measures to trap sediment during the construction period. Stone tracking pad (a/k/a stabilized construction entrance) will be installed at the two construction access drives to prevent vehicles from tracking sediment onto adjacent public ways.

The erosion and sediment control measures will remain in place until all construction activity is complete and the landscaped areas of the Site are fully stabilized. The contractor will be required to inspect all controls regularly to ensure that the controls are working properly, and to clean and/or

reinstall any control on an as-needed basis. The proposed project will disturb greater than one acre of land, and as such, filing of a National Pollutant Discharge Elimination System (NPDES) Stormwater Construction General Permit is required. A corresponding Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the NPDES permit, and will prescribe in detail the performance standards to which the contractor for the Project will be responsible. The SWPPP will be maintained at the construction site throughout the duration of the Project.

Earth Moving

The Site is relatively flat with little to no areas that will represent substantial erosive concern during construction. The only area of the Site subject to significant earth moving activity will be within the building footprint. A preliminary estimate indicates that the Project will result in a net export of soil from the Site of approximately 12,000 cubic yards. Some ledge removal is likely to be required based on the results of a geotechnical investigation coordinated by Clark. The extent and type of ledge removal that will be required to construct the Project is to be determined.

3.3 Site Access Conditions

The parking lot on the north side of the Woodland Administration Building will be used for construction staging, construction vehicle parking, and heavy equipment access and will be replaced to include 9 parking spaces as part of the Project, including full-depth asphalt paving installation. The existing accessible parking spaces and the electric charging station in that parking area will be replaced in kind. The remaining parking spaces, except for 10 existing spaces and the existing curb cut in the lot east of the Woodland Administration Building, will be eliminated to accommodate the new building and adjacent exterior plaza and landscaped areas. The remaining parking aisle and curb cut also provide access to existing parking lots on abutting parcels east of the Site.

As summarized on the Project Drawings, the Project will result in a net reduction of 59 parking spaces.

Pedestrian access to the new building will be provided via a connection from the (plan) east building entrance to Hawthorne Street, and two 10-foot wide walks that connect the (plan) west building entrance and exterior plaza to Woodland Street. An egress door on the (plan) south side of the building also connects to Hawthorne Street via an accessible ramp.

3.4 Stormwater Management

Land Cover

The Project will result in a net reduction in impervious area of 2.874sf (Table 1).

Table 1. Existing and proposed land cover types for the Project

Land Use	Existing (sf)	Proposed (sf)	Change (sf)
Impervious Area (roof, pavements)	44,725	41,997	(-) 2,728
Pervious Area (vegetation, landscape)	19,308	22,036	(+) 2,728
Total	64,033	64,033	---

The net reduction in impervious cover resulting from the Project represents a de facto reduction in stormwater runoff generated by the Site. Therefore, no mitigation measures related to peak flow attenuation, or groundwater recharge are proposed.

Stormwater Management System

Although mitigation measures related to peak flows and groundwater recharge are not required for the Project, runoff collected from most of the Site will be diverted from the combined sewer system in Hawthorne Street and directed to the separated storm drainage system in Woodland Street per the request of the City of Worcester Department of Public Works. Therefore, runoff generated from paved/trafficked surfaces is subject to the Massachusetts Department of Environmental Protection (DEP) water quality standard of 80% total suspended solids (TSS) removal. The reconstructed 9-space parking lot adjacent to the Woodland Administration Building is subject to this standard. Runoff from the existing parking lot is collected in a standard catch basin inlet. Runoff from the reconstructed parking lot will be collected by an inlet-type water quality treatment structure sized to meet the DEP TSS removal standard.

Runoff generated by pedestrian access areas and low points in the landscape will be collected by a series of 15"-diameter area drains. The outlet from the parking lot water quality structure, and the building roof drain will be connected to the landscape drainage system. The collected runoff from these three sources will be routed to the municipal drainage system in Woodland Street.

Two landscape area drains will be located on the (plan) east side of the new building to reduce incidental landscape area runoff and snow melt from draining onto the adjacent sidewalk. These drains will connect to the existing drainage connection to the combined sewer system in Hawthorne Street. Connection of these drains to the Woodland Street system is not feasible due to elevation constraints.

Stormwater Management System Maintenance

A Stormwater Operation and Maintenance Plan is attached that was prepared in compliance with Standard 9 of the 2008 MassDEP Stormwater Handbook to provide best management practices for implementing maintenance activities for the stormwater management system in a manner that minimizes impacts to areas tributary to the municipal drainage systems.

Long-Term Pollution Prevention

A Long-Term Pollution Prevention Plan has been prepared in compliance with the Standards 4 and 9 of the 2008 Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards, which require provisions for the following:

- Good Housekeeping
- Storing materials and waste products inside or under cover
- Vehicle washing
- Routine inspections of stormwater best management practices
- Spill prevention and response
- Maintenance of lawns, gardens, and other landscaped areas
- Storage and used of fertilizers, herbicides, and pesticides
- Proper management of deicing chemicals and snow

3.5 Building Utility Services

Sanitary Sewer

The Project includes a proposed single sanitary service connection to the existing 12" combined sewer main in Hawthorne Street. The estimated proposed sewer flow for the new building is to be provided and will be based on building uses per 310CMR 15.000 – Title 5 criteria.

Water Services

The Project will require relocation of the existing 2" domestic and 6" fire protection services for the adjacent Colin Flug building to the (plan) north of the Site. These water services will be connected to the 12" water main located in Woodland Street (See Site Utility Plan). The new building will connect to the 8" water main in Hawthorne Street with 4" domestic and 8" fire protection services.

Electric Service

A new transformer and emergency generator will be located at the (plan) southeast corner of the building. The equipment will be situated on a terraced platform and screened with a wood fence enclosure. The primary electrical connection location for the transformer is to be determined.

Gas Service

No gas service connection for the new building is proposed.

WATER QUALITY INLET SIZING DATA

Contributing area to Water Quality Inlet #100

1" = 20'

01/20/2022

Nitsch Engineering

Contributing area to Water Quality Inlet #100

1" = 20'

01/20/2022

Nitsch Engineering

Contributing area to Water Quality Inlet #100

1" = 20'

01/20/2022

Nitsch Engineering

Contributing area to Water Quality Inlet #100

1" = 20'

01/20/2022

Nitsch Engineering

WOODLAND STREET

CONTRIBUTING
-AREA TO WQI#100
= 7,687SF

$$18.6 \pm$$

A "W" _____

Nitsch Job # 14804
 Calc: MTB
 Date: 1/20/2022

1" Calculation Sheet

This spreadsheet should be used to convert water quality volume to an equivalent water quality peak flow rate as outlined in the new MA DEP guidelines that take effect on October 15, 2013.

Glossary

Water Quality Flow Rate = WQF
 Water Quality Volume = WQV*
 unit peak discharge (csm/in) = qu**
 Impervious Area in watershed (square miles) = Ai

*WQV is expressed in watershed inches (you must use 1.0-inches in all cases with this method and not 0.5-inches)

** calculate the qu based on the time of concentration (see 1" - qu Table)

Compute Water Quality Flow with the following Equation

$$WQF = (qu)(A)(WQV)$$

Input Information (in colored cells only)

Site Plan Callout		Enter qu (from 1" - qu Table)	Enter Impervious Area (SF)	Ai (sq/mi)	WQV		WQF	
WQI 100	=	774	6787	0.000243	1	=	0.19	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs
	=			0.000000	1	=	0.00	cfs

Sediment Storage Calculation Sheet

Nitsch Job # 14804 Date: 1/20/2022
Project Name: CLARK - MACD BUILDING
Calculated by: MTB Checked by: _____
Water Quality ID: WQS 100

This spreadsheet should be used to calculate the required amount of sediment storage for proposed water quality units.

Assumptions:
*change these as needed

150	mg/L	TSS Loading
48	inches	Annual Rainfall - Worcester Area
2650	kg/m ³	SG
80%		TSS Removal
3	years	Storage Capacity

Input: Drainage Area: 0.18 acres } Input Project Specific
% Impervious: 88.00% of area } Values

Volume of Runoff: 27599.616 cf/year = 781.5328 m³/year

Loading: 0.150 kg/m³

Sediment: 117.230 kg/year = 0.044 m³/year = 1.562 cf/year

Sediment Removal: 1.250 cf/year

**Sediment Storage
Required:**

4 cf

Notes

- 1) TSS Loading is a conservative estimate based on a study completed by Maestre and Pitt in 2005
- 2) Rainfall data is based on information from the City of Worcester
- 3) Specific Gravity is based on the NJDEP testing requirements for dynamic separators.
- 4) TSS removal goal is for storage calculations only.
- 5) Providing 3 years of storage capacity as a factor of safety assuming yearly cleaning of WQS.

DEP STORMWATER CHECKLIST



Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

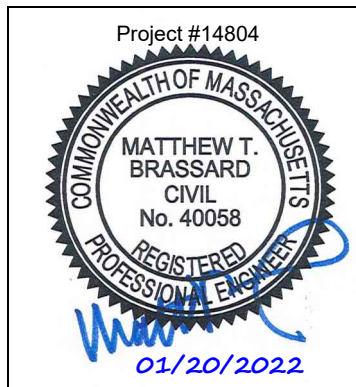
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☐ New development
- ☒ Redevelopment
- ☐ Mix of New Development and Redevelopment



Checklist for Stormwater Report

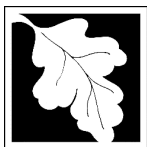
Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
 - ☐ Credit 1
 - ☐ Credit 2
 - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☐ Soil Analysis provided.
- ☐ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - ☐ Static
 - ☐ Simple Dynamic
 - ☐ Dynamic Field¹
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
 - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
 - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- ☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - ☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - ☐ is within the Zone II or Interim Wellhead Protection Area
 - ☐ is near or to other critical areas
 - ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - ☐ involves runoff from land uses with higher potential pollutant loads.
 - ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - ☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☒ The BMP is sized (and calculations provided) based on:
 - ☒ The ½" or 1" Water Quality Volume or
 - ☒ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- ☐ The NPDES Multi-Sector General Permit does **not** cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☐ Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- ☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - ☐ Limited Project
 - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - ☐ Bike Path and/or Foot Path
 - ☐ Redevelopment Project
 - ☐ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- ☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☐ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - ☒ Name of the stormwater management system owners;
 - ☒ Party responsible for operation and maintenance;
 - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
 - ☐ Plan showing the location of all stormwater BMPs maintenance access areas;
 - ☐ Description and delineation of public safety features;
 - ☐ Estimated operation and maintenance budget; and
 - ☒ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- ☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☒ An Illicit Discharge Compliance Statement is attached;
- ☐ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

**LONG-TERM POLLUTION PREVENTION PLAN AND
STORMWATER OPERATION AND MAINTENANCE PLAN**

LONG-TERM POLLUTION PREVENTION PLAN AND STORMWATER OPERATION AND MAINTENANCE PLAN

Clark Media Arts Computing, and Design Building, Worcester, MA

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1.0 INTRODUCTION

The purpose of this document is to specify the pollution prevention measures and stormwater management system operation and maintenance for the Clark Media Arts, Computing, and Design Building site. The Responsible Party indicated below shall implement the management practices outlined in this document and proactively conduct operations at the project site in an environmentally responsible manner. Compliance with this Manual does not in any way dismiss the responsible party, owner, property manager, or occupants from compliance with other applicable federal, state or local laws.

Responsible Party: Trustees of Clark University

This Document has been prepared in compliance with Standards 4 and 9 of the 2008 Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards, which state:

Standard 4:

The Long Term Pollution Prevention Plan shall include the proper procedures for the following:

- Good housekeeping
- Storing materials and waste products inside or under cover
- Vehicle washing
- Routine inspections of stormwater best management practices
- Spill prevention and response
- Maintenance of lawns, gardens, and other landscaped areas
- Pet waste management
- Operation and management of septic systems
- Proper management of deicing chemicals and snow

Standard 9:

The Long-Term Operation and Maintenance Plan shall at a minimum include:

- Stormwater management system(s) owner(s)
- The party or parties responsible for operation and maintenance, including how future property owners shall be notified of the presence of the stormwater management system and the requirement for operation and maintenance
- The routine and non-routine maintenance tasks to be undertaken after construction is complete and a schedule for implementing those tasks
- A plan that is drawn to scale and shows the location of all stormwater BMPs in each treatment train along with the discharge point
- A description of public safety features
- An estimated operations and maintenance budget

2.0 LONG-TERM POLLUTION PREVENTION PLAN

The Responsible Party shall implement the following good housekeeping procedures at the project site to reduce the possibility of accidental releases and to reduce safety hazards.

2.1 Storage of Hazardous Materials

To prevent leaks and spills, keep hazardous materials and waste products under cover or inside. Use drip pans or spill containment systems to prevent chemicals from entering the drainage system. Inspect storage areas for materials and waste products at least once per year to determine amount and type of the material on site, and if the material requires disposal. Securely store liquid petroleum products and other liquid chemicals in federally- and state-approved containers. Restrict access to maintenance personnel and administrators.

2.2 Storage of Waste Products

Collect and store all waste materials in securely lidded dumpster(s) or other secure containers as applicable to the material. Keep dumpster lids closed and the areas around them clean. Do not fill the dumpsters with liquid waste or hose them out. Sweep areas around the dumpster regularly and put the debris in the garbage, instead of sweeping or hosing it into the parking lot. Legally dispose of collected waste on a regular basis.

Segregate liquid wastes, including motor oil, antifreeze, solvents, and lubricants, from solid waste and recycle through hazardous waste disposal companies, whenever possible. Separate oil filters, batteries, tires, and metal filings from grinding and polishing metal parts from common trash items and recycle. These items are not trash and are illegal to dump. Contact a hazardous waste hauler for proper disposal to a hazardous waste collection center.

2.3 Spill Prevention and Response

Implement spill response procedures for releases of significant materials such as fuels, oils, or chemical materials onto the ground or other area that could reasonably be expected to discharge to surface or groundwater.

- For minor spills, keep fifty (50) gallon spill control kits and Speedy Dry at all shop and work areas.
- Immediately contact applicable Federal, State, and local agencies for reportable quantities as required by law.
- Immediately perform applicable containment and cleanup procedures following a spill release.
- Promptly remove and dispose of all material collected during the response in accordance with Federal, State and local requirements. A licensed emergency response contractor may be required to assist in cleanup of releases depending on the amount of the release, and the ability of the Contractor to perform the required response.
- Reportable quantities of chemicals, fuels, or oils are established under the Clean Water Act and enforced through Massachusetts Department of Environmental Protection (DEP).

2.4 Minimize Soil Erosion

Soil erosion facilitates mechanical transport of nutrients, pathogens, and organic matter to surface water bodies. Repair all areas where erosion is occurring throughout the project site. Stabilize bare soil with riprap, seed, mulch, or vegetation.

2.5 Vehicle Washing

Vehicle washing will occur within the covered service area. The car wash will be a state-of-the art system that will reclaim and reuse water for the car wash operation. Eventual discharge of the wash water will be directed to the sanitary sewer.

2.6 Maintenance of Lawns, Gardens, and other Landscaped Areas

Pesticides and fertilizers shall not be used in the landscaped areas associated with the project site and shall not be stored on-site. Dumping of lawn wastes, brush or leaves or other materials or debris is not permitted in any Resource Area. Grass clippings, pruned branches and any other landscaped waste should be disposed of or composted in an appropriate location. No irrigation shall be used in the landscaped areas for this project.

2.7 Management of Deicing Chemicals and Snow

The qualified contractor selected for snow plowing and deicing shall be made fully aware of the requirements of this section.

No road salt (sodium chloride) shall be stored on-site. The use of magnesium chloride de-icing product with a 0.5 to 1.0 percent sodium chloride mix for snow and ice treatment is permitted. The product shall be stored in a locked room inside the building and shall be used at exterior stairs and walkways. The snow plow contractor shall adhere to these magnesium chloride use and storage requirements.

During typical snow plowing operations, snow shall be pushed to the designated snow removal areas noted on the Snow Storage Plan (Figure 2). Snow shall not be stockpiled in wetland resource areas or the 100-foot Buffer Zone, catch basins, or bioretention basins, . In severe conditions where snow cannot be stockpiled on site, the snow shall be removed from the site and properly disposed of in accordance with DEP Guideline BRP601-01.

Use of sand is permitted only for impervious roadways and parking areas. If sand is applied, the snow plowed from impervious areas shall not be stored on porous asphalt.

Before winter begins, the property owner and the contractor shall review snow plowing, deicing, and stockpiling procedures. Areas designated for stockpiling should be cleaned of any debris. Street and parking lot sweeping should be followed in accordance with the Operation and Maintenance Plan.

2.8 Coordination with other Permits and Requirements

Certain conditions of other approvals affecting the long term management of the property shall be considered part of this Long Term Pollution Prevention Plan. The Owner shall become familiar with those documents and comply with the guidelines set forth in those documents.

3.0 STORMWATER MANAGEMENT SYSTEM OPERATION AND MAINTENANCE PLAN

3.1 Introduction

This Operation and Maintenance Plan (O&M Plan) for the Clark Media Arts, Computing, and Design site is required under Standard 9 of the 2008 MassDEP Stormwater Handbook to provide best management practices for implementing maintenance activities for the stormwater management system in a manner that minimizes impacts to wetland resource areas.

The Owner shall implement this O&M Plan and proactively conduct operations at the site in an environmentally responsible manner. Compliance with this O&M Plan does not in any way dismiss the Owner from compliance with other applicable Federal, State or local laws.

Routine maintenance during construction and post-development phases of the project, as defined in the Operation and Maintenance Plan, shall be permitted without amendment to the Order of Conditions. A continuing condition in the Certificate of Compliance shall ensure that maintenance can be performed without triggering further filings under the Wetlands Protection Act.

All stormwater best management practices (BMPs) shall be operated and maintained in accordance with the design plans and the Operation and Maintenance Plan approved by the issuing authority. The Owner shall:

- a. Maintain an operation and maintenance log for the last three years, including inspections, repairs, replacement and disposal (for disposal the log shall indicate the type of material and the disposal location). This is a rolling log in which the responsible party records all operation and maintenance activities for the past three years.
- b. Make this log available to MassDEP and the Conservation Commissions upon request; and
- c. Allow members and agents of the MassDEP and the Conservation Commissions to enter and inspect the premises to evaluate and ensure that the Owner complies with the Operation and Maintenance requirements for each BMP.

3.2 Stormwater Operation and Maintenance Requirements

Inspect and maintain the stormwater management system as directed below. Refer to the Site Utility Plan for the location of each component of the system. Repairs to any component of the system shall be made as soon as possible to prevent any potential pollutants (including silt) from entering the resource areas.

Area Drains

Inspect area drains at least once per month and remove debris from the grate. Clean out accumulated sediments at least once per year and more frequently as necessary.

Water Quality Unit (Proprietary Separators)

Maintain water quality units according the recommendations set forth by the manufacturer. General inspection and maintenance procedures for proprietary devices are provided below:

- Inspect units following completion of construction, prior to being put into service.
- Inspect units at least twice per year following installation and no less than once per year thereafter.
- Inspect units immediately after any oil, fuel or chemical spill.
- All inspections shall include checking the oil level and sediment depth in the unit. Removal of sediments/oils shall occur per manufacturer recommendations.

- A licensed waste management company shall remove captured petroleum waste products from any oil, chemical or fuel spills and dispose.
- OSHA confined space entry protocols shall be followed if entry into the unit is required.

Table 1. Bioretention area maintenance recommendations

Location	Description	Frequency	Time of Year
Surface	Inspect and remove trash	Monthly	Year round
Soil	Inspect and repair erosion	Monthly	Year round
Organic Layer	Remulch void areas	Annually	Spring
	Remove previous mulch layer before applying new layer (optional)	Annually	Spring
Plants	Water vegetation at end of day for 14 consecutive days after planting	Immediately after planting	As needed
	Remove and replace all dead and diseased vegetation that cannot be treated	Annually	Spring
	Treat all diseased trees and shrubs	As needed	Variable

During and after storm events, record the length of time standing water remains in the bioretention areas. If the time is greater than 72 hours, thoroughly inspect the basins for signs of clogging and develop a corrective action plan. The corrective action plan, prepared by a qualified professional, will outline procedures to restore infiltrative function. The owner of the site shall take immediate action to implement these corrective measures.

3.3 Street Sweeping

Perform street sweeping at least twice per year, whenever there is significant debris present on roads and parking lots. Street sweeping shall occur in the spring and fall. Sweepings must be handled and disposed of properly according to the Worcester Conservation Commissions.

3.4 Repair of the Stormwater Management System

The stormwater management system shall be maintained. The repair of any component of the system shall be made as soon as possible to prevent any potential pollutants including silt from entering the resource areas or the existing closed drainage system.

3.5 Reporting

The Owner shall maintain a record of drainage system inspections and maintenance (per this Plan) and submit a yearly report to the Worcester Conservation Commissions.

STORMWATER MANAGEMENT SYSTEM INSPECTION FORM

9 Hawthorne Street Worcester, MA		Inspected by: _____ Date: _____
Component	Status/Inspection	Action Taken
Area Drains and Drain Basins		
Water Quality Unit		
General site conditions – evidence of erosion, etc.		

SUBMIT COPIES OF STORMWATER MANAGEMENT SYSTEM INSPECTION FORM TO THE WORCESTER CONSERVATION COMMISSIONS WITH THE YEARLY REPORT.